

REMARKS

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CLAIM REJECTIONS

Claims 1-10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler"). The Examiner continues to describe the reasons for rejection of the individual claims, and applicants will address these rejections in the order listed in the Office Action for completeness.

FIRST REJECTION UNDER 35 U.S.C. 103

Claim 1 has been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Clark discloses a process for the hydroconversion of a heavy hydrocarbon feed in the presence of a catalyst mixture containing two catalysts that each contain Group VIB and VIII metals on a porous inorganic support and where the second catalyst has an average pore diameter of 20nm. Also Clark discloses that the second catalyst can be unimodal, and the Examiner thus takes the position that the second catalyst would be in the mesopore range having an average pore diameter of 20nm.

However, the Examiner notes that Clark does not disclose that the first catalyst has a surface area of at least 100m²/g, a total pore volume of at least 0.55ml/g, at least 50% of the total pore volume in pores with a diameter of at least 20nm and 10-30% of the total pore volume in pores with a diameter of at least 200nm. Further, the Examiner notes that Clark does not disclose that the pore size distribution is for inhibiting sediment formation.

However, the Examiner takes the position that Schindler disclose a catalyst with a surface area of 125m²/g, a total pore volume from 0.75 to 0.95cc/g, about 60% of the total pore volume in pores with at least 25nm and 21% of the total pore volume in pores with a diameter of at least 150nm. Also the Examiner takes the position that the Table at column 1 of Schindler make

optional that the pore volume of the catalyst to be in pores greater than 25nm.

Thus, the Examiner takes the position that it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Clark to include a catalyst with a surface area of $125\text{m}^2/\text{g}$, a total pore volume from 0.75 to $0.95\text{cc}/\text{g}$, about 60% of the total pore volume in pores with at least 25nm and 21% of the total pore volume in pores with a diameter of at least 150nm.

Further, the Examiner states that the amendment to the claims adding that the pores size distribution is for inhibiting sediment formation does not further limit the claims because such language is functional language, and is thus limited only by the steps of the claims, citing MPEP 2184 III.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that the present invention is not obvious in light of the teachings of Clark in light of Schindler.

The present invention relates to a process for hydroprocessing a heavy hydrocarbon oil involving contacting a heavy hydrocarbon oil in the presence of hydrogen with a mixture of hydroprocessing catalyst I and hydroprocessing catalyst II. Catalyst I comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst I is further described as having a specific surface area of at least $100\text{m}^2/\text{g}$, a total pore volume of at least $0.55\text{ml}/\text{g}$, and a pore size distribution for inhibiting sediment formation and promoting asphaltene removal such that at least 50% of the total pore volume in pores with a diameter of at least 20nm (200\AA), and 10-30% of the total pore volume in pores with a diameter of at least 200nm (2000\AA). Catalyst II comprises a Group VIB metal and optionally a Group VIII metal on a porous inorganic carrier. Catalyst II is further described as having a specific surface area of at least $100\text{m}^2/\text{g}$, a total pore volume of at least $0.55\text{ml}/\text{g}$, and a pore size distribution for inhibiting sediment formation and promoting asphaltene removal such that at least 75% of the total pore volume in pores with a diameter of 10-120nm ($100\text{-}1200\text{\AA}$), 0-2% of the total pore volume in pores with a diameter of at least 400nm (4000\AA), and 0-1% of the total pore volume in pores with a diameter of at least 1000nm (10000\AA).

Clark in its broadest disclosure teaches the use of a two-catalyst system wherein the first catalyst has relatively small pores and the second catalyst has relatively large pores. The first catalyst composition comprises a porous refractory inorganic oxide and possesses a pore volume of less than about $0.10\text{ cc}/\text{g}$ in pores having a diameter of greater than about 200\AA , a pore volume

of less than about 0.02 cc/g in pores having a diameter greater than about 800Å, and a maximum average mesopore diameter of about 130Å, wherein mesopores are broadly defined as pores having diameters in the range of from about 50Å to about 300Å. The second catalyst composition comprises a porous refractory inorganic oxide and possesses a pore volume of greater than about 0.07cc/g in pores having a diameter greater than 800Å. See col. 9, line 60 through col. 10, line 11 of Clark.

Schindler teaches a single catalyst that is useful for hydrotreating feedstocks such as those described at col. 2, lines 24-37 of Schindler. The catalyst is described as containing catalytically effective amounts of nickel and molybdenum supported on alumina wherein the catalyst has a total porosity of at least 0.5cc/g, and most generally from 0.75 to 0.95cc/g, and a pore size distribution as defined in the table in column 1, see col.1, lines 16-33 of Schindler.

While the Examiner contends that including a catalyst such as the type disclosed in Schindler as the first catalyst in Clark would obviate the present invention, applicants respectfully disagree. While applicants do not concede that this combination is proper, applicants respectfully submit that even if one were to combine these teachings one would not arrive at the present invention. Clark is silent as to, among other things, the specific surface area of the second catalyst. Further, Clark does not teach, disclose, or suggest that at least 75% of the pore total pore volume of the second catalyst is pores having a diameter of 10-120nm (100-1200Å). Thus, even if one were to combine the teachings of Clark with Schindler, one would still not be taught the present invention as is presently claimed because one would lack the teaching to use the second catalyst necessary in the present invention.

Applicants also respectfully disagree with the Examiner concerning the use of the functional language in the claims, and applicants respectfully point the Examiner to MPEP 2173.05(g). Based on MPEP 2173.05(g), applicants respectfully submit that the limitations in the claims that the pore size distribution of the first catalyst is selected for inhibiting sediment formation and promoting asphaltene removal and the pore size distribution of the second catalyst is selected for providing catalytic activity are perfectly acceptable and set definite boundaries for the patent protection sought. That being said, applicants submit that neither Clark, Schindler, nor any combination thereof, provides teachings to arrive at a process using a catalyst combination or catalyst combination itself wherein the pore size distribution of the first catalyst is selected to promote asphaltene removal and inhibit sediment formation and the pore size distribution of the second catalyst is selected to provide catalytic activity, as is presently claimed.

SECOND REJECTION UNDER 35 U.S.C. 103

Claims 2-4 have been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Claims 2-4 are obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on pages 4 and 5 of the Office Action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claims 2-4 are not obvious in light of the teachings of Clark in light of Schindler. Claims 2-4 are dependent claims and by definition include all of the limitations of the claims from which they depend. Therefore, claims 2-4 include all of the limitations of novel, independent Claim 1, and are therefore novel for, among other reasons, the reasons discussed above.

THIRD REJECTION UNDER 35 U.S.C. 103

Claim 5 has been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Claim 5 is obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on page 5 of the Office Action.

APPLICANT'S POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 5 is not obvious in light of the teachings of Clark in light of Schindler. Claim 5 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 5 includes all of the limitations of novel, independent Claim 1, and is therefore novel for, among other reasons, the reasons discussed above.

FOURTH REJECTION UNDER 35 U.S.C. 103

Claim 6 has been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Claim 6 is obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on page 5 of the Office Action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 6 is not obvious in light of the teachings of Clark in light of Schindler. Claim 6 is a dependent claim and by definition includes all of the limitations of the claims from which it depends. Therefore, claim 6 includes all of the limitations of novel, independent Claim 1, and is therefore novel for, among other reasons, the reasons discussed above.

FIFTH REJECTION UNDER 35 U.S.C. 103

Claim 7 has been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Claim 7 is obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on pages 5-7 of the Office Action. In short, the Examiner has rejected Claim 7 for the same reasons discussed above in relation to the First Rejection under 103(a).

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claim 7 is not obvious in light of the teachings of Clark in light of Schindler for the same reasons discussed above in the First Rejection under 103(a). Namely, while the Examiner contends that including a catalyst such as the type disclosed in Schindler as the first catalyst in Clark would

obviate the present invention, applicants respectfully disagree. While the applicants do not concede that this combination is proper, applicants respectfully submit that even if one were to combine these teachings one would not arrive at the present invention. Clark is silent as to, among other things, the specific surface area of the second catalyst. Further, Clark does not teach, disclose, or suggest that at least 75% of the pore total pore volume of the second catalyst is pores having a diameter of 10-120nm (100-1200Å). Thus, even if one were to combine the teachings of Clark with Schindler, one would still not be taught the present invention as is presently claimed because one would lack the teaching to use the second catalyst necessary in the present invention.

Applicants also respectfully disagree with the Examiner concerning the use of the functional language in the claims, and applicants respectfully point the Examiner to MPEP 2173.05(g). Based on MPEP 2173.05(g), applicants respectfully submit that the limitations in the claims that the pore size distribution of the first catalyst is selected for inhibiting sediment formation and promoting asphaltene removal and the pore size distribution of the second catalyst is selected for providing catalytic activity are perfectly acceptable and set definite boundaries for the patent protection sought. That being said, applicants submit that neither Clark, Schindler, nor any combination thereof, provides teachings to arrive at a catalyst combination wherein the pore size distribution of the first catalyst is selected to promote asphaltene removal and inhibit sediment formation and the pore size distribution of the second catalyst is selected to provide catalytic activity, as is presently claimed.

SIXTH REJECTION UNDER 35 U.S.C. 103

Claims 8-10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,100,855, Clark, et al. ("Clark") in view of United States Patent Number 4,414,414, Schindler ("Schindler").

EXAMINER'S POSITION

The Examiner takes the position that Claims 8-10 are obvious in light of the teachings of Clark in combination with Schindler for the reasons noted on pages 7-8 of the Office Action.

APPLICANTS' POSITION

Applicants respectfully disagree with the Examiner, and applicants take the position that Claims 8-10 are not obvious in light of the teachings of Clark in light of Schindler. Claims 8-10

are dependent claims and by definition include all of the limitations of the claims from which they depend. Therefore, claims 8-10 include all of the limitations of novel, independent Claim 7, and are therefore novel for, among other reasons, the reasons discussed above.

Based on the preceding remarks, the Examiner is requested to withdraw all objections, reconsider and withdraw all rejections, and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted,



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